

Security and Accessibility Analysis of Electronic Medical Records at Katobengke Community Health Center in 2025

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A B S T R A C T

This study aims to analyze the security and accessibility of electronic medical records (EMR) at Katobengke Public Health Center. The EMR system has been implemented since 2024 through the e-Puskesmas application to support digital documentation and healthcare services. This research employed a qualitative method with a descriptive approach. Data were collected through interviews with three informants—a medical records officer, a nurse, and a doctor—as well as direct system observation. The analysis was carried out using the CIA framework (Confidentiality, Integrity, Availability). The findings show that confidentiality is maintained through individual login accounts assigned according to staff roles, although two-factor authentication and data encryption have not yet been applied. Integrity is relatively strong with audit trails available in some units and routine daily and monthly backups, although change logging is not yet available in the registration unit. Regarding availability, the system is generally accessible when the network is stable, but often encounters disruptions during peak service hours and lacks an official downtime SOP. In terms of accessibility, EMR facilitates quick and real-time access to patient data and supports 24-hour services, although it still depends on internet stability and patients do not yet have direct access to their medical records. In conclusion, the implementation of EMR at Katobengke has improved efficiency in data management and information access, but further improvements in technology, infrastructure, and policy are needed to ensure optimal data security and availability.

INTRODUCTION

The development of information technology has had a significant impact on the healthcare sector, particularly on the management of medical records. Medical records are vital records containing patient identity, medical history, diagnosis results, medical procedures, and treatment processes. These documents serve as the primary guideline for healthcare professionals in providing accurate, safe, and sustainable services. Along with the digitalization of healthcare services, electronic medical records (EMRs) are beginning to be implemented in various service facilities, replacing the manual record-keeping still used in some community health centers (Puskesmas) (Ardianto et al., 2024).

Permenkes No.24 Tahun 2022 defines EMR as patient documents managed electronically using a computer system, with the obligation to maintain data confidentiality, integrity, and availability. The implementation of EMR is considered capable of improving the efficiency and quality of services through faster, more accurate, and more secure data access. Furthermore, EMR can minimize the risk of data loss due to physical damage to documents and support evidence-based healthcare services (Nursetiawati & Gunawan, 2021).

However, implementing EMR is not without challenges, particularly in terms of security and accessibility. Security concerns protecting patient data from unauthorized access, manipulation, and data loss, necessitating encryption, authentication, access control, and regular log audits (Pramesti et al., 2024). On the other hand, accessibility is related to the ease and speed of health workers in obtaining patient information, which is highly dependent on technological infrastructure and human resource competency (Dartini et al., 2024).

Katobengke Community Health Center (Puskesmas) began using the e-Puskesmas application in 2024 to support its RME implementation. This system has streamlined real-time patient data recording and access and reduced document search time. However, challenges persist, including internet network disruptions, the previous limitation of single-account logins, and the lack of standard operating procedures. Recent observations indicate improvements, including the implementation of individual

accounts for each staff member, role-based access restrictions, an audit trail for medical services, and daily and monthly data backups.

In terms of accessibility, the implementation of EMR at the Katobengke Community Health Center has supported data integration with referral hospitals, 24-hour access, and emergency use. However, access speed is still heavily influenced by internet network stability, and there is no backup server or official policy regarding patient access to their medical data. Referring to the ISO 27001 standard, the confidentiality, integrity, and availability aspects of the EMR system at the Katobengke Community Health Center show positive progress, although strengthening technology, regulations, and standard operating procedures (SOPs) is still needed. Therefore, this study was conducted to analyze the security and accessibility aspects of EMR implementation as an effort to improve the quality of medical records management at primary healthcare facilities.

METHOD

This research uses a descriptive qualitative method with a case study design to describe and analyze the security and accessibility aspects of the implementation of electronic medical records (EMR) at Katobengke Community Health Center. The descriptive qualitative method aims to describe phenomena and characteristics in depth, while the case study design allows researchers to examine specific phenomena within specific time, place, and activity boundaries (Fauzy et al., 2022). The research subjects consisted of three informants: one medical records officer, one doctor, and one nurse who actively use EMR. The research object focused on the EMR system at the Katobengke Community Health Center. The study was conducted at the Katobengke Community Health Center in Bau-Bau City, Southeast Sulawesi, from July 2024 to June 2025.

Data collection techniques were carried out through direct observation of the use of RME, in-depth interviews with informants, and documentation related to system implementation (Hardani et al., 2020). The instruments used included observation sheets, interview guides, stationery, and a voice recorder. Data validity was tested using source triangulation, comparing information from three informants who had different but complementary roles. Data were analyzed using stages of reduction, presentation, and verification to identify patterns, themes, and meaning, resulting in valid and accountable conclusions (Sugiyono, 2018).

RESULTS & DISCUSSION

Security and ease of access to electronic medical records (EMR) are fundamental aspects in the transformation of healthcare services into the digital era. Based on the CIA Triad framework, which encompasses confidentiality, integrity, and availability, every health information system is required to maintain patient data privacy, ensure information consistency, and ensure its availability whenever needed by healthcare professionals. Research at the Katobengke Community Health Center (Puskesmas) shows that these three aspects have been implemented through the e-Puskesmas application, although several limitations remain in the technical and regulatory dimensions that require more serious attention (Suhariyono et al., 2025).

In terms of confidentiality, there has been a significant improvement compared to the previous situation. While previously all healthcare workers used only one login account, now each officer has a personal account complete with a username and password. Data access is also restricted according to the user's role and function. For example, doctors have the authority to open patient medical records, nurses can only access data related to nursing procedures, while medical records officers are limited to administrative data. This implementation demonstrates alignment with the principle of role-based access control, which emphasizes the distribution of access rights according to the competencies and responsibilities of each user (Seryaningrum & Ricky, 2025).

This improvement in access control was also confirmed by an interview with a medical records officer who stated: *"We all used one account to log into the system, but now it's been separated. I can only access the administration section, while doctors have more comprehensive access."* (Medical Records Officer, Interview 2025). This quote confirms efforts to improve patient data confidentiality. However, advanced security systems such as two-factor authentication and data encryption are still not available, so the potential risk of data breaches still needs to be anticipated through more comprehensive technological innovation.

Meanwhile, integrity is reflected through the implementation of an audit trail and regular data backup mechanisms. The audit trail feature records every change to medical data, including the

identity of the user making the change and the time of its implementation, so that each modification can be accurately traced. Furthermore, the system is equipped with daily and monthly backups to maintain continuity of healthcare services in the event of technical disruptions. However, the implementation of this audit trail is not yet fully implemented across all units, particularly in the registration department, where documentation of data changes remains weak.

This situation was clarified by a doctor's statement: *"If there's a change in a medical record, the system immediately records who made the change and at what time. That's very helpful if there's data that needs to be verified. But I've heard that not everything is monitored in the registration department."* (Doctor, Interview 2025). This statement indicates that although the data integrity mechanism through the audit trail is in place, its implementation is still partial, potentially leading to inconsistencies in patient data. Therefore, strengthening the integrity system comprehensively remains an urgent need.

In terms of availability, the EMR at the Katobengke Community Health Center still faces various challenges. Under normal circumstances, the system is accessible when the internet connection is stable. However, during peak hours, slowdowns or even complete disruptions often occur, forcing officers to revert to manual recording as a temporary measure. Furthermore, the absence of emergency SOPs or backup servers indicates that the system remains vulnerable to external disruptions, particularly those related to limited network infrastructure (Mulyani et al., 2024).

A nurse shared a similar experience: *"If the internet is slow, we usually write it manually first, then input it once the system is back up. It's a bit of a hassle, but that's how we keep patient data recorded."* (Nurse, Interview 2025). This statement confirms that although the e-Puskesmas system is able to ensure smooth service delivery most of the time, its reliance on external infrastructure remains a weakness in terms of availability and needs to be addressed immediately.

From an accessibility perspective, the implementation of EMR has brought significant changes in supporting service effectiveness. Patient information can be displayed quickly and in real time, integration with referral hospitals has become easier, and data is accessible 24/7, including in emergency situations. However, this access is still exclusive to internal healthcare workers, while patients have not yet been granted the right to access their personal medical data. This situation aligns with the findings of the study Sari, 2025 which emphasizes that providing patient access requires regulatory readiness, clear policies, and increased patient digital literacy to avoid misinterpretation when reading medical records.

A doctor added: *"This RME makes it easier for us to refer patients to the hospital; we can pull up the data immediately. But patients themselves don't have access yet, perhaps because they're afraid of misunderstanding medical records."* (Doctor, Interview 2025). This statement illustrates that although the RME system has proven effective in expediting service delivery, policy limitations related to patient access remain a barrier. Therefore, strengthening regulations and providing more inclusive access rights for patients will be a strategic step in improving the quality of digital-based healthcare services.

CONCLUSION

Based on the research results, it can be confirmed that the implementation of the Electronic Medical Records (EMR) system at the Katobengke Community Health Center (UPTD) has made a positive contribution to improving the quality of health services through the application of the principles of confidentiality, integrity, and relatively good data availability, as well as adequate accessibility to support service efficiency and integration with referral hospitals. However, there are still limitations such as the suboptimal implementation of layered authentication and encryption, the uneven audit trail across all units, weak infrastructure availability such as emergency SOPs and backup servers, and the absence of a data access policy for patients. Therefore, continuous strengthening of technical aspects, policies, and regulations is needed so that the EMR system is not only able to guarantee the security of patient data, but also improve the transparency and quality of health services as a whole.

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